



# CodeHS

## Python Basics with Tracy 2 Course Syllabus

1 Semester for Middle School, 60 hours

### Course Overview and Goals

The Python Basics with Tracy 2 course teaches students extended concepts in Python. Students learn how to use lists, manipulate strings, and work with files by solving puzzles and writing creative programs for Tracy to follow. **Note:** The content taught in the Python Basics with Tracy 1 course must be covered before beginning this course.

**Learning Environment:** The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Students will write and run code in the browser and engage in in-person collaborative exercises with classmates. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students.

**Programming Environment:** Students write and run programs in the browser using the CodeHS online editor.

**Prerequisites:** The Python Basics with Tracy 2 course is designed for students who have taken the Python Basics with Tracy 1 course and have familiarity with turtle graphics and the following concepts: basic commands, for loops, comments, functions with and without parameters and return statements, adding text using **write** and **print**, variables, data types, user input, the **onclick** method, if/else statements, and while loops.

**More information:** Browse the content of this course at <https://codehs.com/course/21069>.

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### Course Content

**Quizzes:** Each lesson includes at least one formative short multiple choice quiz. At the end of each module, a summative quiz is included.

**Challenges & Projects:** Three different types of projects can be found in this course:

- At the end of many modules, students will add on to an *Etch a Sketch* project, applying new concepts they've learned to expand on the project they've been creating. This project expands on the project that was started in the Python Basics with Tracy 1 course.
- Students will have a chance to complete projects with a partner at three points in the course to practice with pair programming and learn how to program with others. These projects include:
  - Digital Art Platform
  - Interactive To-Do List
  - 2023 Stanley Cup Final
- Throughout the course, after learning new content, students will reach project modules where they will complete a larger project from start to finish. These projects are a bit more open-ended and allow students to be more creative in applying their knowledge. These projects are:
  - Ticketing System
  - Timeline
  - Poetry Remixer
  - Python in the Real World

## Course Breakdown

### Unit 1: Refresher: Challenges with Tracy (1 week/ 4 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/29291>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Review of all concepts that should be known before beginning this course</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 9 exercises total</li><li>● Review<ul style="list-style-type: none"><li>○ Nested Control Structures<ul style="list-style-type: none"><li>■ Example Exercise: Grid Write a program that will have Tracy draw a grid on the canvas at each 20-pixel interval.</li></ul></li><li>○ Clickable Interaction<ul style="list-style-type: none"><li>■ Example Exercise: Digital Art Platform With a partner, create a Digital Art Platform that can be used to create digital artwork!</li></ul></li></ul></li></ul>

### Unit 2: Lists (2 weeks/ 10 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28299>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Creating lists</li><li>● Indexing</li><li>● Updating, adding, and removing elements</li><li>● List methods</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 16 exercises total</li><li>● Indexing<ul style="list-style-type: none"><li>○ Each value in a list is assigned an index value which can be used to access the item.<ul style="list-style-type: none"><li>■ Example Exercise: Label Shapes Label each shape using the given list of shapes.</li></ul></li></ul></li><li>● Updating, Adding and Removing Elements<ul style="list-style-type: none"><li>○ The number of items as well as the items themselves can be altered in a list.<ul style="list-style-type: none"><li>■ Example Exercise: Shopping List In this program is a shopping list. As you make your way through the store, update the list by removing the items you've already grabbed.</li></ul></li></ul></li><li>● List Methods<ul style="list-style-type: none"><li>○ The <b>reverse</b> and <b>sort</b> methods can be used to organize items in a list.<ul style="list-style-type: none"><li>■ Example Exercise: Alphabetical Class Roster This program will ask the user for student names and will return the names in alphabetical order.</li></ul></li></ul></li></ul>

### Unit 3: Lists and Loops (1.5 weeks/ 7 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28302>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● List length</li><li>● Looping over lists by index and by item</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 10 exercises total</li><li>● List Length<ul style="list-style-type: none"><li>○ The length of a list can be accessed using the <b>len</b> function.<ul style="list-style-type: none"><li>■ Example Exercise: Disney Princesses Pre 2000's In this program is a list with 3 Disney Princesses. Follow the directions in the program to add the additional 5 Disney Pre-2000 Disney Princesses to the list chronologically and print the list length as it is altered.</li></ul></li></ul></li><li>● Looping Over Lists by Index and Item<ul style="list-style-type: none"><li>○ A loop can be used to access items in a list one by one.<ul style="list-style-type: none"><li>■ Example Exercise: Field Trip This program will be used to see which students can attend a field trip. Only teenagers are allowed to go on the field trip.</li><li>■ Example Exercise: Bar Chart of Pets in Household In this program, you will create a bar graph to display data about how many pets the students in a sample class have.</li></ul></li></ul></li></ul>

### Unit 4: [Project] Ticketing System (1 week/5 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28307>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Review of all concepts through this point</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 2 exercises total</li><li>● Ticketing System<ul style="list-style-type: none"><li>○ Research and design a system that simulates the order of patrons in line.</li></ul></li></ul>

### Unit 5: Strings (2 weeks/ 10 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28294>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Accessing characters and substrings</li><li>● Strings and lists</li><li>● String methods</li><li>● Looping over characters in a string</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 17 exercises total</li><li>● Accessing Characters and Substrings<ul style="list-style-type: none"><li>○ Individual characters in a string have index values and can be accessed individually or in groups, or substrings.<ul style="list-style-type: none"><li>■ Example Exercise: Acrostic Name Poem In this program, create an acrostic poem on the canvas using your name!</li></ul></li></ul></li><li>● Strings and Lists<ul style="list-style-type: none"><li>○ Strings can be converted into lists of characters or words and lists can be converted into strings.<ul style="list-style-type: none"><li>■ Example Exercise: French Cities</li></ul></li></ul></li></ul>

	<p>In this program, you will find a list of 3 cities in France, though one of them is spelled incorrectly. Your job is to update this value.</p> <ul style="list-style-type: none"> <li>● String Methods <ul style="list-style-type: none"> <li>○ Various string methods are available to manipulate strings in different ways. <ul style="list-style-type: none"> <li>■ Example Exercise: CIA Witness Protection In this program, you will find a list of 3 encounters that have been entered into the CIA database. Your job is to keep the identity of Veronica Oshie safe by replacing her name in each encounter to her undercover name, Sam Smith.</li> </ul> </li> </ul> </li> <li>● Looping Over Characters in a String <ul style="list-style-type: none"> <li>○ A loop can be used to access characters in a string one by one. <ul style="list-style-type: none"> <li>■ Example Exercise: Creating User Names In this program, the user will enter names of students and usernames will be created for them.</li> </ul> </li> </ul> </li> </ul>
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### Unit 6: [Project] Timeline (1 week/ 5 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28308>

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>● Review of all concepts through this point</li> </ul>
Example Assignments / Labs	<ul style="list-style-type: none"> <li>● 2 exercises total</li> <li>● Timeline <ul style="list-style-type: none"> <li>○ Research and design an interactive timeline based on the topic of your choosing.</li> </ul> </li> </ul>

### Unit 7: File I/O: Reading From Files (1.5 weeks/ 7 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28305>

Objectives / Topics Covered	<ul style="list-style-type: none"> <li>● What is file I/O?</li> <li>● Reading characters, lines, and all lines from a file</li> </ul>
Example Assignments / Labs	<ul style="list-style-type: none"> <li>● 10 exercises total</li> <li>● What is File I/O? <ul style="list-style-type: none"> <li>○ Data can be provided to programs in various formats and used in different ways. <ul style="list-style-type: none"> <li>■ Example Exercise: Choosing a File Format: TXT vs CSV Explain when you would choose to use a TXT file instead of a CSV file, or vice versa, to store data.</li> </ul> </li> </ul> </li> <li>● Reading Characters, Lines, and All Lines From a File <ul style="list-style-type: none"> <li>○ We can read information from files in various ways. <ul style="list-style-type: none"> <li>■ Example Exercise: Turtle Path In this program, your goal is to guide Tracy along the correct path based on the instructions provided on separate lines in a file called `instructions.txt`.</li> <li>■ Example Exercise: Bar Chart Let's create a program that uses Tracy to create a vibrant bar chart, allowing you to visualize data in a graphical format!</li> </ul> </li> </ul> </li> </ul>

### Unit 8: File I/O: Writing to Files (0.5 weeks/ 2 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28306>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Writing to different locations in a file</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 4 exercises total</li><li>● Writing to Different Locations in a File<ul style="list-style-type: none"><li>○ We can use different methods to write information to a file in various locations.<ul style="list-style-type: none"><li>■ Example Exercise: Secret Message You have come across a mysterious file called `secret.txt` that contains a hidden message. Your task is to decode the secret message by following a specific pattern.</li></ul></li></ul></li></ul>

### Unit 9: [Project] Poetry Remixer (1 week/ 5 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/28309>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Review of all concepts through this point</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 3 exercises total</li><li>● Poetry Remixer<ul style="list-style-type: none"><li>○ Embark on a creative journey to modify an existing poem using file I/O, list manipulation, and string methods.</li></ul></li></ul>

### Unit 10: Python in the Real World (1 week/ 5 hours)

Browse the full content of this unit at <https://codehs.com/library/course/21069/module/29292>

Objectives / Topics Covered	<ul style="list-style-type: none"><li>● Python in research, big data, and for creatives</li></ul>
Example Assignments / Labs	<ul style="list-style-type: none"><li>● 4 exercises total</li><li>● Python in Research, Big Data, and For Creatives<ul style="list-style-type: none"><li>○ Explore how Python is used in various industries.</li></ul></li></ul>